

Content Personalizing By Intelligent Agent in E-Learning

¹Senjaliya mudra ²Dr.Jenila Livingstone L.M

¹School of Computer Science and Engineering, VIT Chennai, Chennai, INDIA

²Associate Professor, School of Computer Science and Engineering, VIT Chennai, Chennai, INDIA

Abstract — Each and every student has different capabilities, the level of understanding that varies based on their knowledge, their interest and grasping power. So the main idea is to use of Information and Communication Technology learning platform to provide different level of personalization to students who have different skills and mind-sets. This paper presents an intelligent agent which makes easy navigation path for students to go through different contents and make it personal as much possible using Multiple Intelligence theory. Agent also checks performance of student by conducting the test and provide suggestions based on their performance.

Index Terms — Content personalization, Intelligent agent, Multiple Intelligence, Navigation algorithm.

I. INTRODUCTION

As learning is never ended process and anyone wants to learn at any age like from small kid to old grandpa, e-learning is the platform which provides facility to all kind of needy people. Education grew swiftly in the world but as time changes learning method, platform varies as like technology varies.

With a fast development of internet, e-learning is becoming a new learning mode as it is not bounded by time and space. The main advantage it has is large number of resources. It has main disadvantage of lack of faculty interaction and low quality resources [1]. So that if student wants to learn new concept but as because of so many options and choices available on internet and less guidance or suggestion gives confusion in student mind and student can't focus on target goal properly. So for that student wants one guide or adviser who can help him in navigation of content.

Recent research on learning shows that students have different ways of learning and they are used to prefer different teaching material also. Some can assimilate in a better way the knowledge received visually, auditory or through a certain sense [2]. Each student has a different set of goals and requirements for a given course and learning style is also singular. So while any one design e-learning curriculum this fact should be considered to achieve good result and also integration of different teaching styles into the curriculum to suit the variety of learners [3].

A. Content Personalization

Here in this paper personalization is given on the basis of content view point means that different learner have their different views. Student who is good in visualization and image grasping the content is provided by graph or image or multi media. Students with good listening skills are given audio as a medium of learning and some other who are good in reading and writing they are provided text content as a medium of learning [1].

B. Multiple Intelligence and Learning style

According to theory of Multiple Intelligence each and every person born with the innate capacity of succeeds in a specific area, and education should help them all to identify as well to develop students' innate capacities.

All students have a particular way of learning that works well for them, such as visually or through hands on activities; therefore learning style varies in all students. So teachers should ensure that students can learn in the best suitable and preferable style.

C. Intelligent Agents

Intelligent Agent means that agent or guide which uses multiple intelligence concept as well rule mining is also done to guide the students. Reference [1] and reference [4] is strictly followed by this agent. The most challenging part of software development can be requirement gathering. If the need are not taken correctly or have missed key requirements, the whole work will be in vain. Even though project budget or time limit is satisfied, work will go wrong to deliver the benefits to the sponsors envisioned for it. In this situation there must be continuous evaluation of the needs given by the customers. The model with intelligent agents in e-learning system has the features of sensing and managing the need of the students [4].

In section 2 all related works and agents are described. In section 3 with methodology of proposed system is described. Section 4 describes limitation of the system and conclusion and future scope is covered in section 5.

II. RELATED WORK

In this section, works and researches done in this area of e-learning is discussed. All the work shows the suitability of intelligent agent in e-learning system to automate and to make the system more comfortable.

Nidhi et al. [4] gave the detailed description of multiple intelligent agents in e-learning environment. They used rule mining to automate the system and three different algorithms

were used by different agents. The agents are designed in such a way that each agent is inter relate with others so dependency retained in system.

Quinghua et al. [1] designed a learning navigation path algorithm to help learner. The algorithm is based on topological sorting and navigation is done by priority given to contents. There is the possibility of having more than one path so for that solution is given by algorithm. The main limitation of this system is it is not giving content personalization to students and system should ask learner about his knowledge.

The solution for same priority content is also given by different algorithm. Knowledge map plays a major role in navigation and it is a simple graph. So simple system gives MCS of target knowledge unit. Then through secondary sort strategy system get whole navigation path in order to guide learners study well. It improves the learning efficiency of learners. [1]

Robert et al. [3] described how reading by learners differs based on their understanding. The correlation between reading and understanding of content is given. Reading by learner is affected by electronic media and devices. This paper gives good answer of these questions.

- 1) The e-curriculum's structure and contents
- 2) How to teach a learner with a particular learning style
- 3) How to effectively learn with particular learning style

III. PROPOSED SYSTEM

In this section, the whole proposed system with diagrams is given.

As shown from fig 1 this system consists four agents, each has its own role and responsibility. The detail description of each and every agent and its work with the diagrams is given below.

A. Personalization Agent

This agent is working with multiple intelligence theory and with different learning styles of students. The main task assign to this agent is to identify characteristics of learner and interest.

As shown below in the fig 2 at the beginning whenever any user or learner login in system agent firstly check whether learner is new or not.

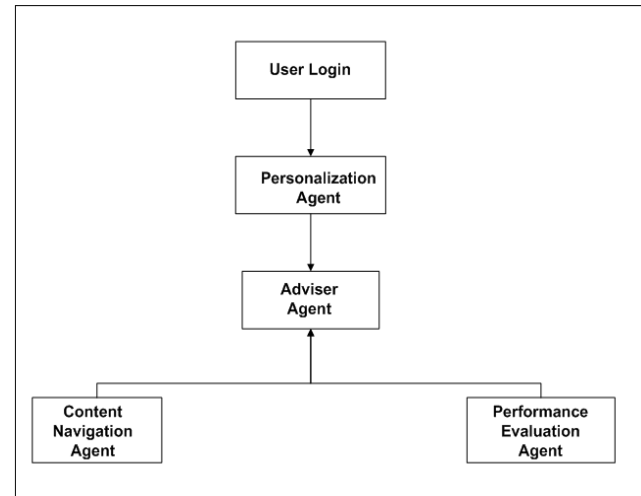


Fig.1 Model of e-learning system with intelligent agents

If the learner is new then the agent will conduct test based on multiple intelligence and identify learner style. Test is conducted and based on response from learner agent to identify learning method of learner [5].

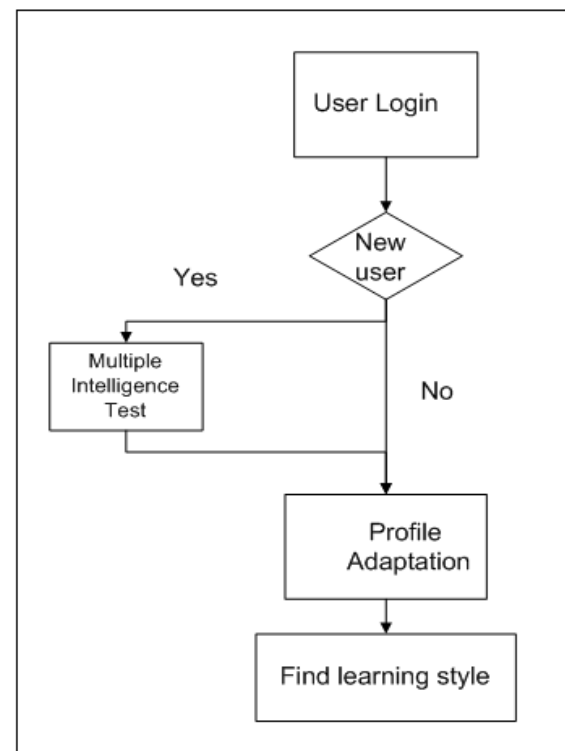


Fig.2 Model of e-learning system with personalized agent

If the learner is not new then profile adaptation is done to identify all unique characteristics of user and learning style. In short all related information of learner is stored in profile and agent will predict learner's mindset from that profile only. Profile contains previously visited courses, tests, marks and also weak subjects.

According to Howard Gardner's theory of Multiple Intelligences, there are basically eight types of intelligence available [5]. He has used eight different criteria to identify the learning styles. So the agent will search best suitable content for learner which should be matched with learning style of learner.

B. Content navigation agent

This agent is useful for navigation of content and will give advice to learner for which path to choose. Topological sorting method is done to identify best suitable way for learning any concept. Here assumption is that learner is new for any concept and don't know from where to start study. As learner has target knowledge unit means goal based on that agent will focus on pre requirement of study, for that agent should know which all concepts already known by learner and which are remaining.

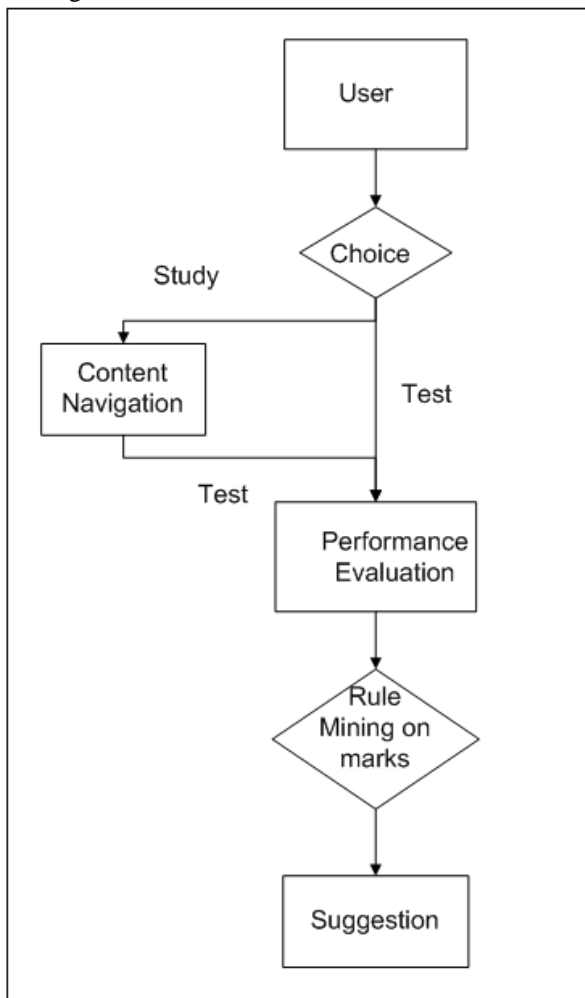


Fig. 3 Model of e-learning system with content navigation agent and performance evaluation agent

As shown in fig 3 agent asks learner for choice whether wants test or learning. If learner wants knowledge about any concept then content navigation agent comes into picture.

Agent will help the learner throughout the time period of learning to guide him. Agent can get prior knowledge of learner from profile of that learner or if learner is new then agent can ask learner to give details of his already known concepts so that agent can identify better path for learner.

C. Performance evaluation agent

This agent is useful to evaluate performance of learner. One of the disadvantages of e-learning is lack of interaction with teachers or faculties. So a problem arises here is how learner can evaluate by own self, as today so many websites and electric media available for that but no one gives good advice to learner for which subject he is lacking.

Performance evaluation agent conduct test for concept which is known by learner and collect marks for each subject. Then rule mining is done and some predefined rule is applied on it to identify which subject learner knows well and which need attention. As shown in fig 3 suggestions are made by agent after applying rule mining on learner's marks.

Here in this system implementation two possibilities are there to do rule mining on obtained marks as given in reference [4]. One way is system can decide predefined standard marks to identify knowledge level and the other way is to do relative marking on all subjects and find weak subject.

Agent suggests learner relatively means based on overall performance in study and also note learning style used by learner is appropriate or not. If agent found that with the changes in learning style performance also varies then agent should decide which style is giving maximum performance and related changes should be done in profile of the learner also.

D. Adviser Agent

This agent is center of all other agent which uses result or output of every agent to give better combined output to learner. Agent take information from profile and identify which style is best suitable, it takes navigation information from navigation agent to identify best path of study and also combine information from performance evaluation agent to identify which subject need more attention and which subject is strong.

So with the help of all this information of learner adviser agent can advise system to work in that manner to give well learning environment to learner.

This agent is the core of the system as with the help of any single agent system cannot work properly and efficiently as single agent's scope is limited. But adviser agent uses all the core concept of all agents so scope is system wide and gives maximum throughput to system.

IV. IMPLEMENTATION

At present the work of multiple intelligence is done. The agent is capable enough to guide learner in which way learner should learn means which style is best suitable for efficient learning for that sorting is done on marks and appropriate

content is provided to student. Suppose student is very much good in analytical skill then games and puzzles are the efficient way to learn subject. So personalization of content is done based on multiple intelligence test.

learn and which is the correct path for clear learning without any gap.

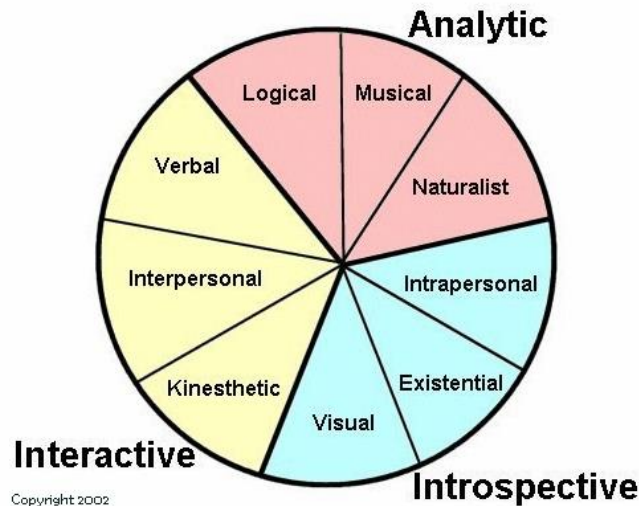


Fig. 4 Multiple intelligence test analysis

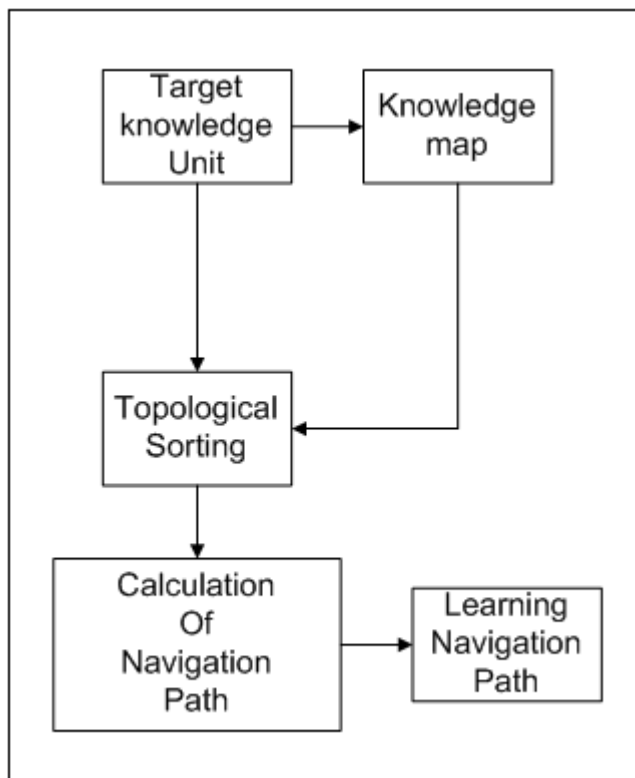


Fig. 5 Working of Content navigation agent internally

As shown in fig 5 system takes input from learners as which content they want to study and also use knowledge map for topological sort. So using this concept we can provide excellent guideline to student that in what way he/she should

V. LIMITATION OF SYSTEM AND FUTURE SCOPE

As Antonio et al. [7] told that combining learning objects are challenging and difficult because of its direct application to course generation, tailored to the students' profile and preference. In this system complexity is the problem as it is not so easy to search content so quickly from internet which is perfectly matched with learner's requirement. Sometimes content may not be available in particular format so in that situation agent should be prepared in such a way that it should be able to find other alternative content for learner. For prioritization is required as based on priority of learner if first priority content format is not available then agent should check for next priority.

Consistency in working of all agents is required as if one agent is not working properly then performance of whole system goes into vain. Adviser agent takes output from all the agents and combines them so if any output is wrong then total combined output will become wrong and satisfaction level of learner will decrease immediately. To solve this problem dependency should be reduced and maximum robustness is advisable.

The system should not offer the same content in the same way for all learners because their personal knowledge preferences and objectives are hardly equal. So in this system agents should take care of it and need to implement one technique using which agent can test by its own self. At present no testing strategy is described so in future to check correctness of agent by implementing another novel algorithm.

For each and every subject system need knowledge map so pre requirement of having knowledge map is not giving better throughput to system. So to solve that problem system should be able to generate knowledge map dynamically using index of course and for any new future content no need to store knowledge map statically in system, system should capable enough to generate it by traversing content.

VI. CONCLUSION

This proposed system is useful to all the kind of learners and especially for new learners in particular area. As system will guide learner in all the way the lack of faculty in online or in electrical media can fulfill by this system and new level of success can be achieved by learner. E-learning environment will achieve new level of intelligence and also flexibility and convenience can be improved for learner. This system is helpful for weak learners by suggesting them in which subject they are lacking and for intelligent learners by simply giving them navigation of the content which they need to follow. This system tried best to take place of faculty and make learning as

simple as classroom learning for all kind of learners and makes environment more personal.

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